

Chapter 1: GENERAL

1.1 Introduction

The CALFED Record of Decision (ROD) identifies five surface water storage projects: Enlarged Shasta, Los Vaqueros, Sites Reservoir, 250 to 700 TAF of additional storage in the upper San Joaquin River watershed and In-Delta Storage. The purposes of new storage in the Delta are to increase operational flexibility for the Central Valley Project (CVP) and the State Water Project (SWP) and to provide ecosystem benefits in the Delta. The ROD includes an option to explore the lease or purchase of the Delta Wetlands (DW) Project, a private, In-Delta storage proposal by DW Properties. The ROD also provides the option to initiate a new project, in the event that the DW Project proves cost prohibitive or infeasible.

In 2001, the California Department of Water Resources, Bay-Delta Agencies (formerly CALFED agencies) and the U.S Bureau of Reclamation began a joint planning study to evaluate the DW Project and other In-Delta storage options. The joint planning study, completed in May 2002, concluded that the project concepts proposed by DW were generally well planned. However, project modifications and evaluations were needed to make the project acceptable for public ownership. The DW project has since been revised and studied as the In-Delta Storage Project. Additional information on In-Delta Storage are available at <http://www.isi.water.ca.gov/ssi/indelta/index.shtml>

The In-Delta Storage Project consists of developing Webb Tract and Bacon Island as reservoir islands. To mitigate the environmental impacts caused by the proposed project, Holland Tract and Bouldin Island will be developed as habitat islands. The locations of the project and habitat islands in the San Joaquin-Sacramento Island Delta are shown in Figure 1.1. Water will be diverted to the In-Delta Storage reservoirs during the winter months when flows are high and released back to Delta channels during the summer months when demand is high and flows are low.

The project islands soil is predominantly from carbon-rich peat and during the storage period it is expected that leaching of organic carbon (OC) from this soil together with biological productivity could increase OC loads in the reservoirs. Because of the proximity of the project to urban intakes, total organic carbon (TOC) and other water quality standards like Chloride, Bromate, Trihalomethane and Water Temperature could be impacted by reservoir releases. Thus, estimates for OC concentrations and other water quality measures of the stored water and the impacts of the released water at the urban intakes and Delta channels are keys to assessing the viability of the project. This report summarizes the findings of a series of numerical and experimental studies intended to assess the impacts of In-Delta Storage projects in the Delta water quality.

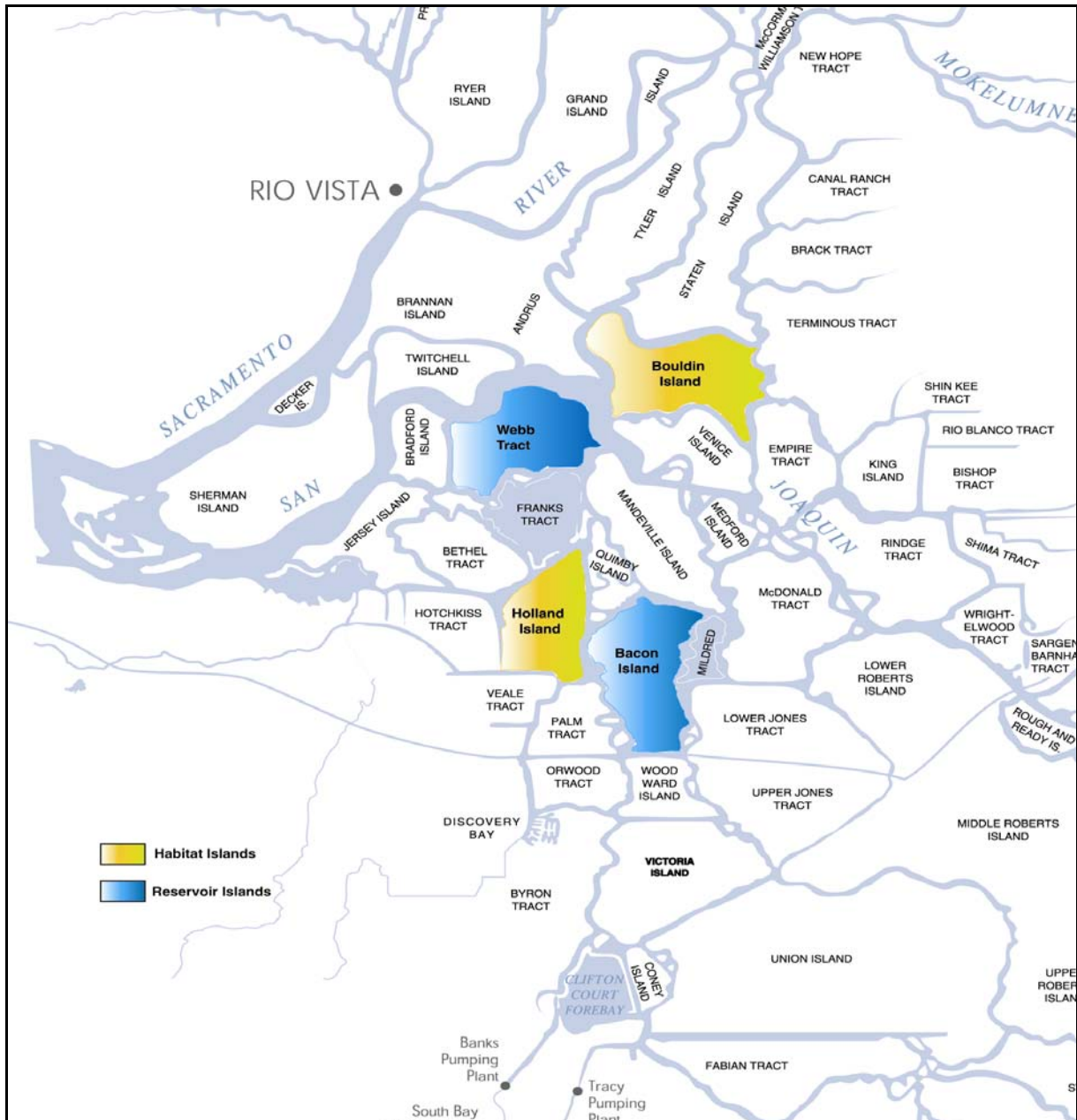


Figure 1.1: Proposed Habitat and Reservoir Islands for In-Delta Storage Project

1.2 Water Quality Requirements

The water quality requirements for the DW Project are set forth in SWRCB Decision 1643 (D1643) as agreed by DW Properties and the California Urban Water Agencies (CUWA). The ISI operations must be carried out such that the guidelines outlined in Water Quality Management Plan (D1641) and D1643 are not violated.

1.2.1 General Requirements

Discharges of water from the project shall not cause: (1) an exceedance of any applicable water quality objective in a water quality control plan adopted by the SWRCB or by the RWQCB; (2) any recipient water treatment plant to exceed the maximum contaminant levels for disinfection byproducts as set forth by EPA in Title 40, Section 141.12 & 141.30. The regulated classes of disinfection byproducts are trihalomethanes, haloacetic acids, chloride, and bromate (SWRCB, condition 14.a.). For the purpose of determining that the Project has caused an exceedance of one or more of the operational screen criteria, an uncertainty of $\pm 5\%$ of the screening criteria will be assumed.

1.2.2 Long-Term Requirement

The Project is required to mitigate 150% of the net increase in TOC and salt (i.e. TDS, bromide and chloride) loading greater than 5% in the urban diversions due to Project operations.

1.2.3 Total Organic Carbon

The project operation shall not cause or contribute to total organic carbon (TOC) concentrations that will violate either criterion:

- Increase in TOC concentration at a SWP, CVP, CCWD pumping plant, or at a receiving water treatment plant that will cause the limit of 4.0 mg/L to be exceeded;
- Incremental increase in TOC concentration at a SWP, CVP, or CCWD pumping plant of greater than 1.0 mg/L (14-day average) (SWRCB, condition 14.b).

In this study DOC was used as a surrogate for TOC.

1.2.4 Chloride

Chloride concentration shall not:

- Increase more than 10 mg/L chloride concentration at any of CCWD's intakes
- Cause any increase in salinity of more than 10 mg/L chloride (14-day running average salinity) at any urban intake in the Delta
- Cause or contribute to any salinity increase at one or more urban intake in the Delta if the intake is exceeding 90% of an adopted salinity standard (Rock Slough chlorine standard defined in SWRCB Decision 1641) (SWRCB, condition 14.c.)

1.2.5 Disinfection Byproducts

The Project operations will be curtailed, rescheduled, or constrained to prevent impacts on drinking water quality at any water treatment plant receiving water from the Delta based on the following WQMP screening criteria:

- Modeled or predicted Total Trihalomethanes (TTHM) concentrations in drinking water in excess of 64 µg/L as calculated in the raw water of an urban intake in the Delta or at the outlet of a water treatment plant.
- Modeled or predicted Bromate concentrations in drinking water in excess of 8 µg/L as calculated in the raw water of an urban intake in the Delta or at the outlet of a water treatment plant.

1.2.6 Dissolved Oxygen (DO)

No discharge of stored water would be allowed if the DO of stored water:

- Is less than 6.0 mg/L, or
- Causes the level of DO in the adjacent Delta channel to be depressed to less than 5.0 mg/L, or
- Depresses the DO in the San Joaquin River between Turner Cut and Stockton to less than 6.0 mg/L September through November. (SWRCB, condition 19.a.)

1.2.7 Temperature

No discharge of stored water would be allowed if:

- The temperature differential between the discharged water and receiving water is greater than 20° F,
- If the discharged water causes an increase in the temperature of channel water by more than:
 - 4° F when the temperature of channel water ranges from 55° F to 66° F
 - 2° F when the temperature of channel water ranges from 66° F to 77° F
 - 1° F when the temperature of channel water is 77° F or higher (SWRCB, 20.b)

1.3 Scope of Work

1.3.1 Modeling Studies

The Delta Simulation Model (DSM2) was used to assess the impacts of the In-Delta Storage reservoirs on Delta water quality in channels and at urban intakes. The following work was done as part of the modeling studies.

- Revise the organic carbon growth algorithm in DSM2 to address carbon loading from peat soils and biological productivity.
- Revise estimates for likely organic carbon concentrations in storage water in comparison to the base No Action condition.
- Create dispersion rules for CALSIM II recirculation studies and check final reservoir DOC at the urban intakes for the final CALSIM II run.
- Compare water quality constituents under base No Action conditions with In-Delta Storage Project operations under D1643 and WQMP.
- Provide input to Reservoir Stratification studies.

1.3.2 Water Quality Field Investigations

The following work was done as part of the field investigations to estimate the organic carbon loading from peat soils and biological productivity on the reservoir islands.

- Review literature on organic carbon loading in the Delta for information that may be applicable to In-Delta Storage project.
- Evaluate likely DOC concentrations and loads expected in the stored water using mesocosms or physical models of the proposed reservoir islands.
- Integrate results from filed studies with mathematical models of the proposed reservoir islands.

1.3.3 Temperature and Stratification Modeling

The DYRSEM model study was conducted by the Flow Science Inc., and the study period covered three representative years (dry, normal and wet) for different project operation scenarios. The DYRSEM model study focused on the following issues.

- Develop meteorological data sets for the reservoir islands.
- Determine if the reservoir islands will stratify using the one-dimensional DYRESM model.
- Quantify likely water temperatures for the reservoir islands and discuss potential changes in channel temperature resulting from reservoir discharge.

A report by Flow Science Inc. outlining the detailed methodology, assumptions and results of the DYRSEM model studies of the In-Delta storage islands is given in Appendix C.

1.4 Organization of Report

This report has four sections and one appendix. This section is organized to present general information including the overview of the project and scope of the work. Methodology and findings of the DSM2 model studies of water quality parameters are given in Chapter 2. Chapter 3 provides the details of the Water Quality Field Investigations. DO and temperature modeling study results are given in Chapter 4. Conclusions of the study and recommendations are given at the end of each chapter. Consultant's report on stratification of the reservoir islands are given in the appendix.